

The End-user Identity Paradox

“An Assigned Telephone Number Has
An End-user But The End-user
Has No Face”

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For Discussion Purposes Only

Identity ?

1-555-555-5555



All assigned telephone numbers have an End-user. However, not all End-users at the overall system level have a face or universally agreed upon identity.

Impact of the End-user Identity Paradox

- Determining End-user Identity is a dilemma in:
 - End-user ENUM (Authentication, Authorization and Validation)
 - Next Generation Network Identity Management
 - Next Generation Network Security
 - Toll Free Number Management
 - VoIP Porting (Possibly)

Key Contemporary End-user Identity Issues

- **End-user ENUM**-(red highlighting added for emphasis)

- “While the objectives of the trial were met, it should be noted that there are aspects of End-user ENUM that are not yet fully developed. One primary example is the **authentication and authorization** process necessary to ensure that only current assignees of telephone numbers would be allowed to register those numbers.”

Source: CC1 ENUM LLC End-user ENUM Trial Report cover letter to Mr. John M.R. Kneuer, October 26, 2007.

(<http://ustrial.enumllc.com/>)

- “UKETG did an enormous amount of work on **authentication and validation**. This is a very hard problem. There are a large number of awkward corner cases (for example, DDI blocks, pay-as-you-go mobile phones, premium rate and non-geographic numbers, and so on) that present difficult challenges. Other obvious challenging cases include ex-directory numbers and households when many people share the one phone number. UKETG has demonstrated how to perform authentication with or without the participation of the relevant telephone company. This is a very valuable result from the trial. Even so, more work still needs to be done in this area.”

Source: UK ENUM Trial Group (UKETG) Report, May 2004, EXECUTIVE SUMMARY, page 5, (

<http://www.ukec.co.uk/docs/UKETGReportFinal.pdf>)

Key Contemporary End-user Identity Issues (continued)

•End-user ENUM-(continued)

“Authentication Agency

- Proposed solution for the authentication problem
 - > How can we be sure someone “owns” the telephone number they are registering?
 - > Complicated by UK Telephone Numbering Scheme
- Privacy & commercial confidentiality issues
- **No centrally-maintained database”**

Source: An Introduction to ENUM, UK Network Operator’s Forum
London, Jan 10th, 2006, Jim Reid, RTFM Ltd, page 27, (
<http://www.uknof.org.uk/uknof3/Reid-ENUM.pdf>)

Key Contemporary End-user Identity Issues (continued)

- End-user ENUM-(continued)
- **“How is the user of a number authenticated?”**
- Users could be corporations, individuals, government agencies, military organizations and hosts of other non-individual users. Service providers typically assign large blocks of numbers to these entities; the telecom manager within these entities then assigns numbers to users, so even the service providers cannot identify the users for a large portion of the allocated numbers. **This is an unresolved issue**, but one that must be resolved prior to deploying a robust and secure ENUM service. It is likely that the service provider that allocated the number(s) to the user will be involved in the process of authentication.”
- Source: Neustar, ENUM website,
- (<http://www.enum.org/faq.html#31>)

Key Contemporary End-user Identity Issues (continued)

- **Next Generation Network Identity Management** –
 - “The *personal profile* is the cornerstone of an End-user-centric world. Today, End-users are confronted with fragmented service, requiring them to enter and maintain equivalent information several times – for example: address books, buddy lists, billing and payment preferences, phone numbers, presence, and ring-tones.”
 - Source: [ATIS NGN Framework Part III: Standards Gap Analysis](http://www.atis.org/obf/_com/docs/sag/060518001att.pdf), page 9, May 2006 (http://www.atis.org/obf/_com/docs/sag/060518001att.pdf)
- **Next Generation Network Security** –
 - “**3.4 User Account Management** - Authentication Credentials Management spans the creation, archiving, distribution, and revocation of digital credentials supporting authentication and authorization for a heterogeneous mix of managed elements, across the following areas
 - Individual user account creation.
 - Specification of user identifiers.
 - Resetting of user passwords.
 - Specification and maintenance of user access rights and privileges.”...
 - “**3.5.1 Assessment** - ... ‘To date, there has been no successful effort to pull these sources of data together and provide detailed standards for the telecommunications industry related to these topics. There are no detailed standards or guidance that would provide telecommunications companies a roadmap to design and implement these functions. ‘ “
 - Source: ATIS TECHNICAL & OPERATIONS (TOPS) COUNCIL Security Issues Focus Group Security Issues, page 41, April 20, 2004
 - (http://www.atis.org/obf/_com/docs/sag/ATIS-WP-Security%20Issues-FINAL.pdf)

Key Contemporary End-user Identity Issues (continued)

- **Toll Free Number Management** –
- ATIS, Ordering and Billing Forum, SNAC Issue 2617
- “While any Resp Org, either on its own initiative or at the request of a customer, can implement procedures to reduce the likelihood of a slam of a toll free number in a request that is submitted directly to the current Resp Org, there is currently no means by which a Toll Free Service End-user Subscriber can prevent an unauthorized slam if a request is submitted directly to the Help Desk. The unauthorized porting of Toll Free numbers is no less serious than slamming of outbound services, and is likely to be more difficult to detect and to causes greater monetary damages to the End User Subscriber.”

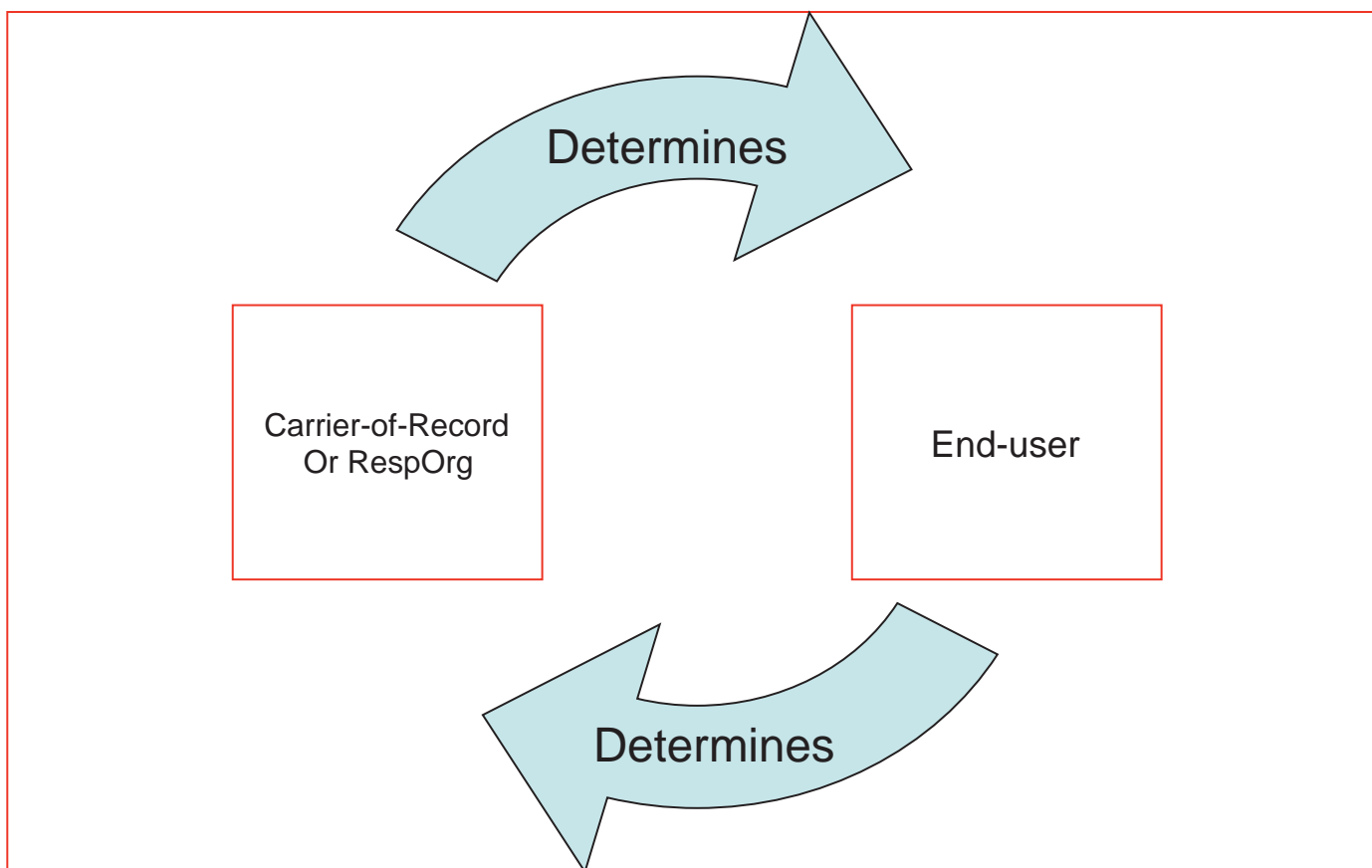
Circular Logic

- The Catch-22 or Liar Paradox
 - If each assigned telephone number has an End-user then it would seem that the End-user should be identifiable.
 - But, at the overall system level, there is an unanswerable question regarding the true or false nature of a given End-user identity.
 - Since the Carrier-of-Record (Geographic) or the Responsible Organization (RespOrg in Toll Free) determines the End-user but the “valid” End-user determines the Carrier-of-Record or RespOrg for the telephone number there is a self-referential structure that results in a paradox regarding the true or false nature of the statement “I am the ‘valid’ End-user”.

Is This Statement True or False?

- “I am lying” This statement is neither true nor false because it is self-referential. (Liar Paradox or Epimenides Paradox)
- “I am the valid End-user because the Carrier-of-Record/RespOrg that I select identified me as such”. This statement is also circular and/or self-referential.

Self-Referential Structure



Putting a Face to the End-user

1-555-555-5555

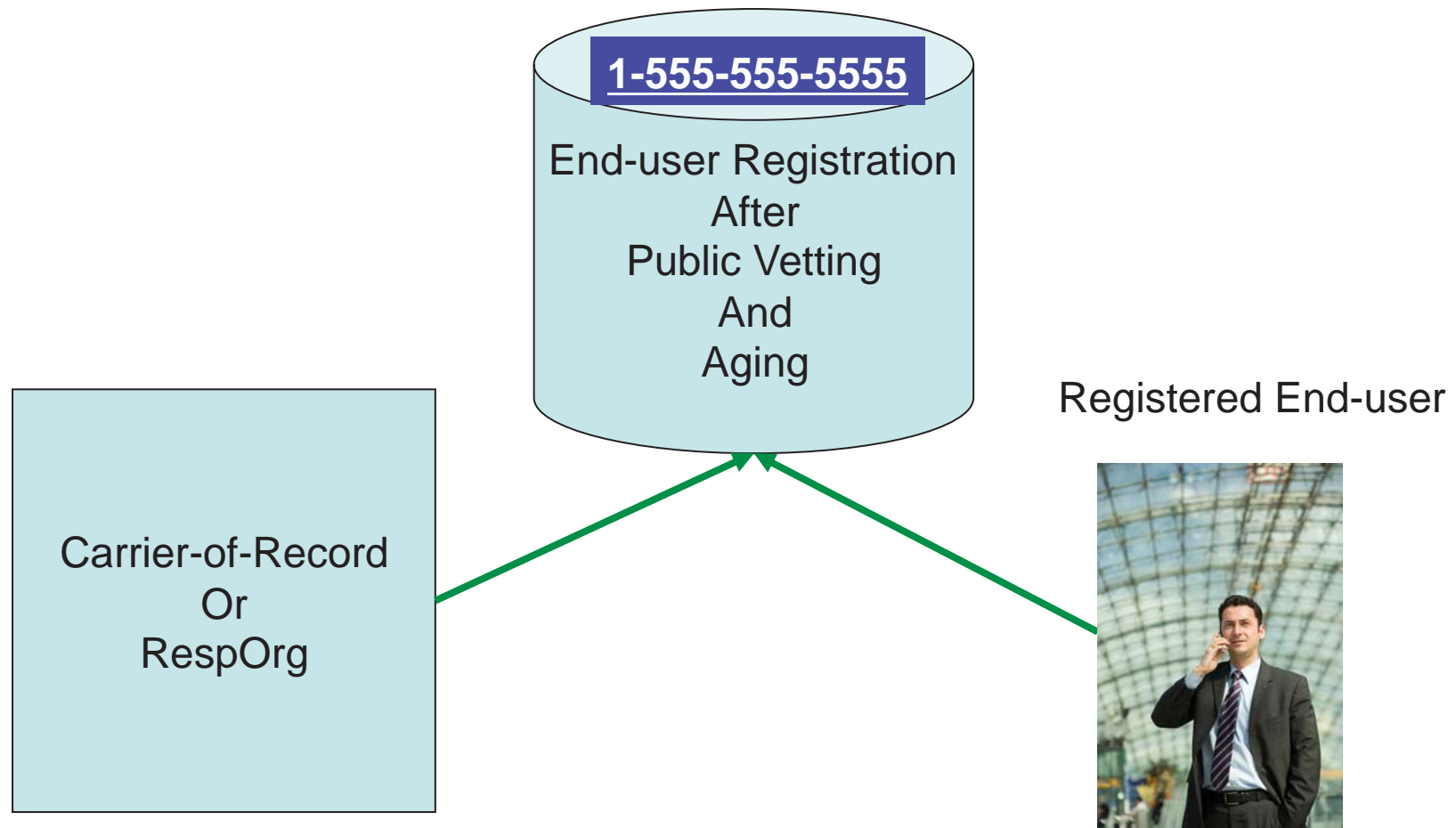


Vetted Registration



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Central Database To Break The End-user Identity Paradox



Summary

- **Identity** - Determination of End-user Identity for a given telephone number is a current dilemma at the overall telecommunications and media delivery system level without an objective database that contains the definitive identity of the End-user.
- **Self-Referential** - The existing circular structure of the End-user designating the Carrier-of-Record/RespOrg while the Carrier-of-Record/RespOrg designates the End-user Identity creates a key Next Generation Network telecommunications and media delivery paradox.
- **External Database** - Creation of an objective database such as End-user ENUM for registration and incorporating public vetting and aging to establish definitive End-user identity for a given telephone number could break the current circular dilemma surrounding determining End-user Identity.
- **Registration, Public Vetting and Aging** – This **process** could contain key components for establishing and validating overall system level End-user Identity for successful implementation of Next Generation Network services. Moving forward with End-user ENUM implementation and an enhanced End-user ENUM registration process could be the key to ending this vexing paradox.